POPULATION GROWTH AND ENVIRONMENTAL RECOVERY: More People, More Trees, Lesson Learned from West Gurageland[1]

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Abstract

This paper surveys the impact of growing population pressure on the environmental resource base of Ethiopia at large, and that of West Gurageland in particular, as reflected in the land use/land cover changes in light of the two noted and widely held neo-Malthusian (pessimistic) and Boesrupian (optimistic) views. The direction and magnitude of changes in the natural resource base and in population are evaluated and the driving forces of the changes are identified. By way of assessing policy implications of the two outlooks, the author argues that neither the pessimistic nor optimistic assessments, separately, can completely explain the relationships that exist between population, natural resources and rural economy in West Gurageland.

Data needed to appraise the spatio-temporal patterns of the population and resource base of the study areas were obtained from census reports, statistical abstracts, documents and aerial photographs spanning four decades. The GIS softwares such as MDSD, ARC/INFO and Arc View were used to process the land use data and evaluate the changes observed in the land use/land cover of six sampled Kebele Peasant Administrations (KPAs). The survey results showed that Ethiopia has a diversified and huge natural resource base, which is degraded and found in a critical state. At the national level, deforestation takes place at a rate ranging between 160,000 to 200,000 hectares per annum and forest cover decreased from about 35 - 40 % in 1900 to less than 3% at the moment. The amount of soils washed away ranges between 1.2 and 1.9 billion tons every year from the highlands. Furthermore, the land use survey results in West Gurageland revealed that cropped area and settlements, respectively, increased by about 25% and 35% in the last four decades. Pastureland and shrubland decreased by about 34 and 15% respectively. Wastelands increased by about 53% while eucalyptus tree density increased by about 170%. Hence, the state of 'more people more trees' dictum holds true in this case. Grazing area and shrub land decreased while wastelands increased. Nearly all the 315 respondents undertook tree planting and more than half of them were involved in making terraces and building check dams.

In such dynamics, the impact of population growth is very important but cannot be considered the only critical condition. There are other socio-economic factors including government policy environments and institutional settings such as lack of land tenure security, poor infrastructure development, lack of good governance, social and political instability and civil war. These could have been equally or more important to population pressure in explaining the observed changes.

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Therefore, it is likely that population growth has not alone been responsible for natural capital resources management problems, stagnation of land use technology and agricultural productivity, and changes in the land use/land cover. Although land degradation due to soil erosion was observed, environmental enhancement resulting from increased tree density and other land conservation activities were also registered in West Gurageland. This substantiates the positive outlooks toward population growth. However, as there is variation among farm households, environmental recovery due to increased planted-tree density may not necessarily implicate growth in the economy.

1. Introduction

Nowadays, increased stress on the limited resources of the earth due to unprecedented human population growth makes resource-population relationship studies one of the most important and urgent needs of many societies. This paper, therefore, surveys the spatio-temporal dynamics observed in the population, environment and land use/land cover of Ethiopia with particular emphasis on West Gurageland. Impact of growing population pressure on natural capital resources and land use/land cover changes is assessed in the light of two widely held, and yet polarized, views of neo-Malthusians' and Boserupians'. The link between population and the environment, on the one hand, and population and the economy, on the other, has been one of the most critically debated issues. Many people consider that the most unfavorable changes in the environment and the economy of many pre-industrial societies, most particularly degradation and poverty respectively, are the result of fast population growth. But there is a new school of thought that views population growth, all other things remaining in a normal course of move, can induce innovation, environmental recovery and, consequently, growth in the economy.

One of the greatest challenges to the Ethiopian economy is linked with the problem of rural environment, which supports more than 85% of the total population of about 67 million people. The economy of the country is predominantly agricultural, which has been the main source of food for the overwhelming rural people. However, it is unfortunate that the Ethiopian agriculture is subsistence-based and traditional; uses simple and archaic tools; is controlled by climatic vagaries and the meager resources of peasants. Moreover, rising material consumption compounded by unprecedented growth of human population, continuous cultivation, overgrazing, deforestation, and political, economic and cultural forces that relate to peasant agriculture have exerted enormous pressure on the ecosystem and hence created mounting stress on the natural resources of the country. The environmental problems of the country, which reflected on the unfavourable change in land use/land cover, as recorded by

many writers, involved depletion of the natural cover of the country including deforestation, soil erosion and the disturbance of both underground and surface water regimes.

Many writers (for example, Markos {1990, 1997}, Getachew {1995}, Shibru {1996}, TGE {1993}), in view of the orthodox neo-Malthusian position, reported, among other things, that increasing population pressure has resulted in land scarcity, expansion of cultivated land, reduced fallow period, rise in stocking density, overgrazing, deforestation, land use conflicts and competition, accelerated soil erosion and hence environmental degradation. Shortage of forage due to overstocking and expansion of cultivation has also forced households to divert crop residues to feeding livestock and burning. This probably has reduced the nation's production capacity significantly with total crop yields falling from about 12.5 quintals per hectare (1979/80 to 1985/86) to 11.7 quintals per hectare in 1995/96(CSA 1987a; CSA 1996a) in the private sector. Hence, land degradation emerged as one of the most serious challenges to the sustainability of land use, food security and rural development in Ethiopia. This may be considered one of the most serious threats to this agrarian nation; it could have jeopardized the sustainability of the traditional mixed farming system and adversely dictated household's food security position of the country.

In spite of what has been noted in the preceding paragraphs, and contrary to the doom-laden and widely held view of the neo-Malthusians, many recorded increased tree density following population growth in Ethiopia and elsewhere. For example, Tiffen et al. (1994) and Mortimore (1995) reported environmental recovery and economic growth among the Akambas of Machakos in Kenya as a result of population growth in the last 60 years. Can this establish the fact, as advocated by some authors, that *more people* means *more trees*? Can the *more people more trees* state of affair substantiate environmental recovery and economic growth in the region? Moreover, in the context of Ethiopian situation in general and West Gurageland in particular, and based on the experience of other countries, should we consider population growth as a threat or opportunity in connection with environmental management and economic growth? Which socio-economic, political and institutional factors, other than demographic forces, can be attributed to deteriorating rural environment in Ethiopia in general and West Gurageland in particular?

2. Theoretical Framework

The linkages between population, economy and environment have been a widely held concern and debated issue amongst governments, NGOs and academics. There has been a long established tradition of academic thought, as noted by John E. Murton (1997), stretching back to Condorcet and continuing up to the present day, regarding the ability of societies to provide food and facilities for their citizens as population grows. Unlike many academic debates, the issue of the link between population, environment and development has been hotly debated and regularly featured in many widely read publications. It has also been widely discussed by heads of states at international conferences such as the Earth Summits held in Rio de Janeiro and Johannesburg in 1992 and 2002 respectively.

Many expect that the unprecedented rapid population growth of most part of developing countries, in the 20th and 21st centuries, will severely compound the current agricultural and environmental crises. Many popular and academic narratives, such as, for example, the one noted by Donald Crummey and his co-writer (2003:91), about rural Ethiopia attributed environmental and social crises to population pressure and stasis in peasant farming technologies. On the contrary, others believe that population growth will stimulate sustainable agricultural growth and environmental management, which leads to a general economic development and environmental enhancement (Tiffen et al, 1994: Boserup 1965). Hence, degradation and intensification are the two polarized expectations.

Nonetheless, one can find, at least, four theoretical propositions in connection with what the World Bank referred to as *population, agriculture and environment nexus*. Broadly interpreted, the four theories view the relationships optimistically or pessimistically, or take a neutral position and ground much of the arguments within the roles played by population pressure or economic development (Kates 1993). Neo-Malthusians (doomsayers) have negative expectations and consider that population has the potential to outstrip food production. The prestigious Pearson Report published in 1969 and noted in the Africa Report 1974 concluded "no other phenomena casts a darker shadow on the prospects for international development than the staggering growth of population. Robert McNamara, the President of the World Bank, went on saying that to put simply: the greatest single obstacle to the economic and social advancement of the majority of the peoples in the underdeveloped world is the rampant population growth" (Pradervand, 1974). Accordingly, in light of the teachings of Thomas Malthus (1798), neo-Malthusians assert that rapid population growth has the potential to exceed the growth of agricultural production. This leads to natural resource degradation, food scarcity,

and poverty (Ehrlich, 1977; Ehrlich and Ehrlich, 1988, 1990; Lockwood, 1995; Brown, 1995; MacDonald, 1989). Population growth in subsistence economy induces environmental degradation due to land scarcity, land fragmentation, overcultivation and overstocking, decline in agricultural productivity, which, in turn, results in either stunted growth of the economy or poverty (Ehrlich, 1977, 1988, 1990; Boulding, 1973; Meadows, 1972; Hardin, 1974; Tolba, 1986; Brown, 1995; MacDonald, 1989).

Many other writers maintain a similar view. For example, Murton (1997) reported that, in Mboni, Kenya, population growth undermined the ability of farmers to straddle and innovate, pushing more innovators into the poorest group of farmers. In the Awaka-Nnewi region of Nigeria incidence and hazards of escalating soil erosion led to further loss of scarce land and deterioration of soil fertility as population increased (Okafor 1993). Adrian Wood (1990) noted that population kept on growing and pressure on land has been escalating in the Northern Highlands of Ethiopia. Hence Wood affirmed that it is unlikely that the region can continue to give support to the population using the same pattern of production as it does now.

On the contrary, Boserupians, following Ester Boserup, have positive expectations in connection with population growth in societies of subsistence economy. They regard population growth as a stimulus to agricultural intensification (Boserup 1965, 1981) and environmental recovery (Simon 1986, 1992; Tiffen 1994; Murton 1997). Boserup (1965, 1981) and Simon (1986, 1992) considers that changes in land use technology have been a function of endogenous causes (population growth). But contrary to this, some writers argue that technological change has been externally induced by changes in the land-labor or fertilizer-land ratios and prices (Hayami 1985; Ruttan 1989).

A renewed interest in Boserupian ideas regarding population and agricultural intensification and environmental recovery began towards the end of the 1980s and early 1990s (Ruttan and Thirtle 1989; Goldman 1993). The idea of environmental recovery was picked by Mary Tiffen and her co-writers (1994). They regarded population growth as one of the major changing variables and stimulus for agricultural intensification and environmental recovery in the Machakos, Kenya. They developed a model that describes environmental recovery and economic growth following population growth in the Machakos, which was essentially based on the idea of Boserup (1965; 1981), although they gave allowance to the effect of external market and inflow of ideas from external sources.

A third, more neutral view is that population growth is neither strongly positive nor negative. Rather it considers that environmental and agricultural problems have either social, or political or economic causes (Lockwood 1995a). In the light of

this, Templeton and Scherr (1997) assert that what matters for sustained use of lands is not only the number of producers but also what, where and how they produce. Indeed, many empirical researches indicate that population growth in the hills and mountains of many Developing Countries can lead to either land enhancement or degradation, or aspects of both. The decision, which outcome is more likely, depends on the understanding of how population growth affects microeconomic [environment] (Templeton and Scherr, 1997:29).

Finally, the revisionist or technological position is currently associated with Julian Simon. As noted by Tiffen (1995), Julian Simon asserts that technological progress counters the effects of diminishing returns and leads to income growth through discovery of new resources and improvements of resources. Therefore, Simon contends that more people generate the necessary new ideas that may be employed for innovations and technological change (Simon 1986, 1992). To him more people mean more accidents, more variety, more advances in knowledge and productivity. Therefore, in conjunction with Boserup (1965,1981), he considers that technological change has been a function of population growth (Simon 1986).

3. The Link between Population and Degradation

The link between population and resources, depending upon the microeconomic incentives, could, either, be unfavourable and leads to environmental degradation, or else stimulates environmental recovery, or both. In the two very contrasting examples that John English (1993) considered, viz the Ethiopian highland and Machakos in Kenya, the in conditions in the former case did not foster social and economic change; rather population pressure has been accompanied by a greater likelihood of land degradation. On the other hand, in Machakos great technical and social changes have occurred and the area has accommodated a markedly increased population while reducing the perceived level of land degradation.

The widely held neo-Malthusian view of population growth is considered an important factor in environmental degradation and it is frequently linked to poverty. Population growth can aggravate environmental degradation, if it is exacerbated by the cumulative effects of historical factors and policy and market failures, which lead to a situation characterized by unequal access to resources, conditions favouring demands for large families, underdeveloped human capital, and land use technology stagnation (Shammugartham 1992). Growing population of a high dependency rate, probably because of poor nutrition and health and no opportunity for non-farm income, attempts to scratch a living from poor soil using manual methods and a traditional cropping system in conditions where contact with the wider world and new ideas are limited. Such areas would have a minimal

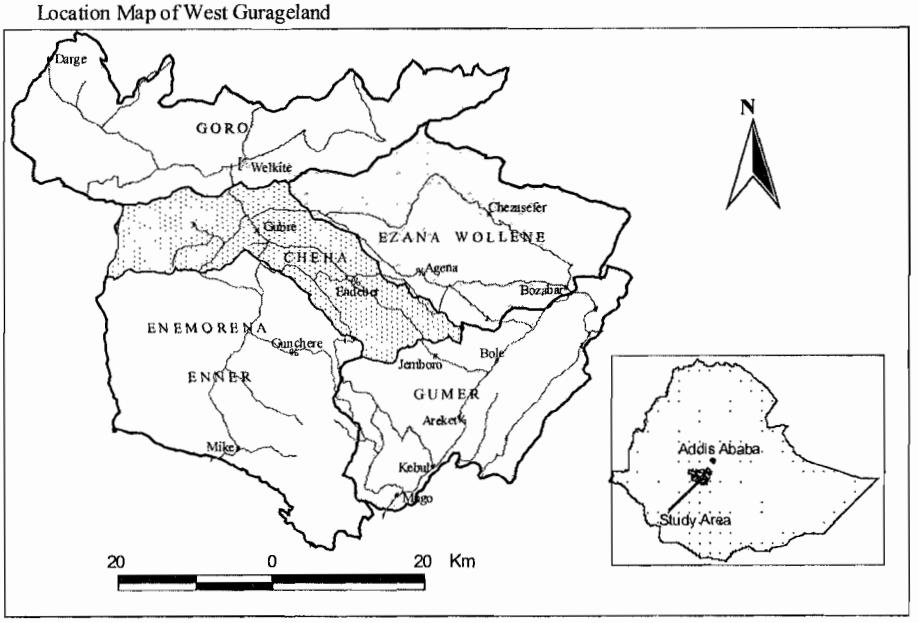
ability to support growing population and might end up in resource degradation and starvation or emigration (Boserup 1965).

However, population growth may not lead to environmental degradation if there is a reasonable amount of natural resource base, significant access to internal and external markets, opportunities for non-farm income sources, active private trading network, fair social and physical infrastructure, reasonable social and political stability, forward looking society, and good governance (English, 1993). Under such circumstances, population growth leads to an increase in demand for food and other resources, which in turn stimulates economic and social changes, as well as changes in the land use technology (Boserup 1965, 1981; Simon 1986, 1992). Indirectly, an increase in the density of population means that the number of people who can be served from an individual location (other things being equal) increases; conversely, the cost of providing service to a given number of people falls. At the same time the number of other individuals, with whom one person is likely to interact, will rise, which will tend to increase the exchange of ideas and flow of information and increase the likelihood of new ideas and innovations being generated. This, in turn, will assist in solving the supply problems generated by population growth.

4. The Study Area, Data Source, Acquisition, and Methods of Analyses

The study covers Ethiopia but more emphasis is put on western part of Gurage Zone, West Gurageland. It is found in the Southern Nations Nationalities and Peoples Region (SNNPR). It incorporates five *weredas*, namely, Cheha, Ezana Wollene, Ennemorena Enner, Gummer and Goro. The first four of these form the so called *Sabat Bet Gurageland*, traditionally federated region in the Gurageland. The region is located in the southern rare of the Shewan (Central) Plateau, about 150 to 220 kilometre south of Addis Ababa. It is one of the most densely populated pockets in Ethiopia. The population of the region is highly mobile and characterized by rural out-migration (Muluneh 1994, 2003; Worku 1995) and known for its ensete culture (Shack 1965; Muluneh 1994, 2003). assumed to reflect transformations recorded in the agricultural system and the environment.

Location Map of West Gurageland



Out of 334 Kebele Peasant Administrations (KPAs) found in the region, six of them, two each in the *kolla* (Jatuna Aradashe and Tawulana Seyoma), the *woina dega* (Kochira and Shebraden) and the *dega* (Koter Gedera and Burdenana Denber) agroclimatic zones, were selected to evaluate changes in the pattern of land use/land cover of the region in multitemporal and spatial perspectives. Selection of the six KPAs was made on purpose; I took into consideration the access they have to roads, their population concentration and physical expanse, and land degradation problems. They make a good mix in terms of environmental diversity, and variation in population concentration, farming system and access to transport facilities and towns. For example, Koter Gedera and Sheberaden KPAs have seriously degraded areas because of erosion while in the rest, particularly in Burdenana Denber soil erosion is of least importance. Burdenana Denber and Kochira are most densely populated and located very close to towns, while Tawulana Seyoma and Jatuna Aradashe have the most sparse population distribution and found far away from urban centres.

The study also assesses the magnitude of changes in land use/land cover at a country level. Data on the state of environmental resources and degradation at the natioal level were obtained from secondary sources. Land use/land cover data of the six KPAs were aquired from existing old aerial photographs of 1957, 1967,

1971 and recent one of 1999. Interpretation was done based on observations made in the field followed by identifying the various land use/land cover units. Then, using the GIS softwares such as MDSD, ARC/INFO and Arc View, the aerial photographs of the six KPAs were digitized and changes in the area of each land use unit for the two periods were evaluated. Furthermore, data on activities that are related to environmental conservation were aquired from 315 households. The 315 households were selected ramdomly amongst the have, have not and those which are neither poor nor rich households in the six sampled KPAs. The study adopted zonal /regional/ approach in describing and then explaining patterns of changes and trends in the land use/land cover.

5. Changes in the State of Population and Natural Capital Resources

Throughout history, people and governments have been concerned with the relationship between people and natural resources that are at their disposal. Given the fact that resources are limited, the pressure that population exerts on resources has been the primary reason for such a concern. The appraisal of strains on natural capital resources and the economy due to population pressure presupposes assessment of population size and its distribution. Future school enrolments and the need for other social amenities, the size and location of new social and physical infrastructures, including the establishment of new institutions, land use intensity, etc. require the knowledge of population size, composition and distribution, and how population is expected to change.

5.1 Change in population size, growth rate, and density and vertical distribution

As a result of unprecedented human population growth rates of the world and Ethiopia, the number rose to 6 billion and 67 million, respectively, at the beginning of the new millennium (2000). By the turn of the 20th century the population of Ethiopia was estimated at about 11.754 million. Thereafter, the population size of Ethiopia multiplied by more than 5 fold. Fifty years later, in 1950, it reached 19.2 million. By 1960 it made a substantial increase and grew to about 23.6 million (CSO 1964). The population kept on increasing at an unprecedented rate and reached about 43 million in 1984 (CSA 1987b) and 53.4 million in 1994 (CSA, 1998a). These days, authorities of the National Population Office, and Ministry of Economic Development and Finance, estimate it to be 69 million. Moreover, based

on the 1994 Population and Housing Census result, it is expected to increase to 83.5 million by the end of the first decade of the new millennium (CSA, 1998b).

It is difficult to reconstruct the size of the Gurage[1] population in the long past. However, Antonio Cecchi (1886) estimated the Gurage population at 40,000 in the last quarter of the nineteenth century. A.N. Trucker and M.A. Brayon, and the Gurage Exhibition Committee (1955), respectively, furnished a figure of 350,000 and 500,000 in the 1950s. The 1984 Population and Housing Census reported that the total Gurage population that lived within and outside their homeland, was 1.9 and 2.3 million in 1984 and 1994, respectively, (CSA 1998). If the population of Ethiopia continues growing at rate of 0.01% more than the annual rate of growth of the previous year (CSA, 1985), the size of the Gurage population, including Seltes, was expected to reach more than 2.7 million by the close of the twentieth century. The population of West Gurageland increased from about 701,033 in 1984 to 832,528 in 1994. Based on medium variant population projection adopted for the SNNPR, it was estimated at one million by the turn of the century (2000) (CSA, 1996a). As a result of such an unprecedented increase in the absolute size of population, pressure on the available natural capital resources is expected to increase both at national and regional levels.

Newly added people demand for additional food and other necessities. The change in population pressure is tantamount to the number of new people added in the regions. The density of population at global scale was about 13 persons per square kilometre in 1900. This has increased to 18.5 persons per square kilometre in 1950 and reached 44 persons by the turn of the second millennium. In Ethiopia, it was about 10.6 persons per square kilometre in 1900; 17.5 persons per square kilometre in 1950; 34.5 in 1984 and 60 persons per square kilometre by 2001. In West Gurageland, however, it has increased from 173 in 1984 to more than 250 persons per square kilometre by 2000. The rise in density has been emphatic for it increased by about 1.4 and 7.3 persons per square kilometre per annum for Ethiopia and West Gurageland since about 1984 and 1994 respectively. Thus, the pressure, assuming all other conditions remaining constant, on land resources increased more than 3 to 5 fold in the region as compared to the national average in the last three decades.

Population numbers and densities at global scale diminish with altitude, particularly beyond the sub-tropical latitudes where environmental hostility increases with elevation. Contrary to this, however, in the tropics (for example in Ethiopia), population concentration increases with elevation. Regions that are more

1 Gurage population figures include that of Gurages proper and Seltes.

than 1500 meter above the mean sea level that cover *woina dega* and *dega* agroclimatic zones are more hospitable to human occupation because of climatic amelioration. Therefore, about 89% of the population of Ethiopia is concentrated in the two agroclimatic zones that account for less than 65% of the total area of the country. On the contrary, peripheral lowlands of the country that lie below 1500 meter and which may be generalized as *kolla* and *bereha* agro-climatic zones that account for about 35% of the country have been sparsely inhabited by only about 10% of the population (Aynalem, 1987). This is attributable to environmental hostility, arid and semi-arid climate. There is similar reflection of population concentration in West Gurageland. Therefore, the stress on land resources and the environment due to population concentration increases with elevation. Concentration is the highest in *woina dega* and *dega* agro-climatic zones. This is reflected on changes that are observed in the land use/cover and status of environmental capital resource base of the country.

5.2 Change in the Status of Environmental Resources

5.2.1 Natural capital resource base.

Ethiopia has a huge and well-diversified resource base by an African standard. It is one of the largest in sub-Saharan Africa. The natural capital resource base of the country is highly diversified due to its topographical and geological peculiarities, its location in the Horn of Africa, at the junction of two continents, its large area, and the fact that it lies along one of the flora and fauna 'corridors of migration'. There are several relict natural regions such as the Denakil Depression, the Semen and Bale Mountains with their unique and fragile ecology, the Lakes' Region, canyons of Abay and Tekeze Rivers, Sof Omer Cave found at the entry gate of 30 kilometre long subterranean passage of the Weyb River, etc. There are also a considerable number of animal and plant species, which are peculiar to the country. In light of this, Georgi Galprin, by way of emphasising the great natural resource diversity and potential of the country, referred to Ethiopia as a 'unique museum of nature' (Galperin, 1981).

However, for many reasons the natural capital resources of the country, land resources in particular, including floristic and faunistic resources, and the landscape have been showing signs of degradation interpreted by many experts as indicators of impending environmental crisis (Hoben 1995). Rate of land degradation has grown very serious and has started threatening the lives of millions of Ethiopians since about the second half of the 20th century. It is only since the

1973/74 droughts and famine that the problem of environmental degradation has been recognized and given more attention in the country.

5.2.2 Land degradation

Land degradation, occurring in many forms, is one of the most serious problems facing Ethiopian agriculture, more markedly in the highlands. Environmental degradation in Ethiopia or elsewhere leads to damage of ecological systems so that in the end the capacity to operate is undermined and productive processes are greatly reduced. Reduction in agricultural productivity occurs most severely through soil erosion that are induced by water and associated biological forces (FAO 1986). Moreover, it was noted that land degradation has been manifested in the form of soil removal caused by sheet, rill and gully erosions; nutrient depletion due to burning of animal dung, crop residues and other forms of biomass; nutrient loss due to crop removal without replacement; and continued loss and degradation of forests and other floristic (resources) (EPA 1994). In this light, one can identify two most important forms of environmental degradation in rural Ethiopia: the loss and depletion of soils and biodiversity. It is also recognized that there is a serious disruption of both surface and underground water regime and the hydrological cycle at large.

Land degradation, largely due to soil erosion by surface runoff, has been variously rated since about the 1960s. In the early 1980s, the Ethiopian Highland Reclamation Studies (EHRS) reported an estimated amount of about 1900 million tons of soil eroded from the highlands every year (Constable, 1984). In the second half of the 1980s, Hans Hurni reported that the rate of soil loss in the highland parts varies considerably depending on the type of land use and differences in agro-climatic zones. Highest rates were predicted for cultivated slopes in the *dega* zone (2400-3300m) while the loss from grasslands is 3 to 10 times lower compared to cropped areas. Accordingly, he predicted the annual soil loss rate to range from 1 ton for forest area to 70 tons in currently unproductive land, which account for about 3.8% of the country; 5, 8 and 42 tons per hectare per annum for grazing and wood land, perennial cropland, and annual cropland respectively. But the average soil loss rate for the whole country was estimated at 12 tons per annum, while the absolute yearly total loss was about 1.5 billion tons (Hurni 1988).

5.2.3 Forest degradation

The vegetation formation of Ethiopia varies from Afro-alpine to swamp vegetation, semi-desert and desert vegetation. The formation comprises of high forests, moist western forests, deciduous woodlands, acacia woodlands, savannah grasslands, bushes with rangeland, and others. The forests have been found in the altitude zone ranging from about 1400 to 2500 (3000) meters above sea level (Sutuma Edessa 1993). While considering the longitudinal profile of deforestation in Ethiopia, it should be clear at the outset that there have been no reliable records of the extent of the country's forest prior to recent times. Mooney (1955), the modern forestry expert, as noted by Richard Pankhurst, argued that Ethiopia was 'densely wooded' in 'ancient and not so remote times'. But, it appears that there is no way of establishing how much of the country was actually forested, or at precisely what period and at what rate it was deforested (Pankhurst, 1992).

However, many authors, based on existing indigenous residual forests and the ecological settings of the country, have tried to reconstruct the forest cover of the country in the long and short past. The various estimates made by different authors, noted by Crummy (2003) and Woin (1995), showed that once in the long past, about 30-48% of the country, but as much as 87% of the highland, was covered by forest vegetation. But some writers, for example, Tewelde Berhan Gebre Egzibher (1996), argued that most of the highlands had been deforested at least by the 16 th century, and probably as early as the 6 th century.

Depletion of forests has been in the order of 6-20% between 1950 and 1966, and has accelerated since the late 1960s and early 1970s (Dessalegn, 1996). The rate in this period was estimated in the range of 2-6%. Accelerated forest degradation in this particular period, according to Sutuma (1993), was due to changes in the climate of the country. However, Dessalegn (1996) largely attributed it to changes in government and poor land use policies.

The rapid deforestation rate, which started at the turn of the last century has reached the highest level today. Currently, forests are cleared at a rate ranging from 16,000 to 200,000 hectares per annum (Sutuma 1993). The residual forests, which escaped destruction, are found in the remote and inaccessible areas of sparsely populated sections of Southwest Ethiopia. The forest cover, what is left over, accounts for about 3% or less of the area of the country (about 9% of the highlands). However, the Federal Government of Ethiopia was engaged in woody vegetation inventory using satellite imagery. The government communicated to the public in mass media, based on the result of the survey, that woody vegetation cover of Ethiopia could be as much as 17% of the country in 2000.

The reduced vegetative cover and humus content in the soil, combined with the increased frequency of cultivation together with the physical impacts of cultivation on the soils, led to damages in soil structure. This has discouraged infiltration of rainfall, and led to increased surface and subsurface runoff, erosion and loss of topsoil, which in turn reduced the moisture storage capacity of the soil and aggravated soil erodibility. This also has adversely affected soil fertility and crop yields, with feedback effects on the farming system leading to further expansion of cultivated to marginal lands. Moreover, environmental degradation resulted in the deterioration of rangeland due to heavy grazing, which increased soil erosion and surface runoff, all of which have reduced the productivity of the land. Consequently, annual crop yields are expected to have declined, on the average, by about 2.2% from the 1985 level (Constable, 1984).

5.2.4 Cost of degrada*tion*

Rough estimates of the cost of land degradation showed that the Ethiopian highlands have been loosing, on the average, about EB6000 million per annum (about 24000 million birr at current rate of exchange) for the last 25 years since the first half of the 1980s (Constable 1984). If land degradation were allowed to continue at current rates, most of the highland population would sooner or later be adversely affected by degradation. It has been estimated that by 2010 about 7-8% of the soils in the highlands of Ethiopia will be reduced to bare rock surface and a further 12% will have a depth of only 10 cm or below (Constable, 1984). More recently, Sutcliffe (1993) estimated the total crop output loss in the country due to soil erosion at 8,760 metric tons in 1985 and projected to reach 331,990 metric tons by 2010. Similarly, his estimates of cropland and pastureland losses for the year 2010 are 489,300 and 5,747,350 hectare respectively. Environmental degradation has been most serious in the northern highlands, which have one of the longest settlement histories. Although the problem of environmental degradation in the south appears less severe than in the north, it has already begun, while in the lowlands there are a variety of problems associated with deforestation for agriculture in the wetter areas and overgrazing in some of the grasslands.

6. Causal Factors of Environmental Degradation

Environmental managers, conservationists and land use planners need to know what is happening to the environmental settings before making suggestions for interventions. They also need to be aware of the forces operating, individually or in combination, behind the environmental problems. Some authors take a simplistic

view that expansion of cultivation due to population pressure alone has caused environmental degradation in Ethiopia. These observers arrive at unrealistic conclusions and suggest population alone must be reduced in order to address the problem. However, other observers recognize the complexity of the situation and explore the ways in which various factors influence environmental degradation (Dessalegn, 1996; Wood n.d.). There are vast ranges of influences upon environmental management, some of which are *environmental* (natural) while many others *socio-economic, cultural, political and institutional.* Their relative impact would vary from one area to another even within the highlands.

Environmental (natural) factors that have aggravated land degradation in the highlands of Ethiopia include the nature and characteristics of the terrain, rainfall, and the type of soils. Within the highlands of the country the terrain is characterized by high relief, high slope angles exceeding 30% in more than 70% of the highlands, and long slope length. These have made many parts of the highlands prone to soil erosion once the natural vegetation cover is removed. Rainfall in the region is seasonal and highly concentrated in a few wet months and high proportion of it comes in heavy storms and downpours, and hence, it is highly erosive. Thus, the raindrops have considerable force to break up soil granules and block soil pores reducing infiltration, which, in turn, increases runoff and then erosion. Many of the soils in the highlands are clay loam type, which are often waterlogged and more susceptible to erosion by running water in the absence of vegetation cover.

Human actions such as farming practices, overstocking, increasing human population pressure, overstocking, and use of animal dung and crop residues in place of fuel wood also have contributed to environmental degradation. In addition to clearing forest vegetation for further expansion of cultivation, the emphasis upon small-seed cropping requires preparation of fine-tilts seedbeds. With the simple and archaic scratch-plough, *maresha,* this requires multiple crossing of the field that breaks down the soil structure in the top 6-10 cm. As a result there is severe erosion on ploughed fields during the torrential downpours at the start of the rains. Moreover, the preference for annual cereal cropping in many parts of the highlands, the absence of permanent crops and practicing monocropping rather than inter-cropping facilitates erosion. Growing crops on residual moisture at the end of the rains, to avoid water logging, also accelerates soil erosion and the drainage channels made across fields increased runoff concentration that promote new gully erosion.

In the highlands of Ethiopia, peasants, by and large, practice mixed farming, cultivate crops and rear cattle for multiple purposes. Along with rearing sheep and goats, this has led to a large livestock population, shortage of pasture and

overgrazing. This has also discouraged the regeneration of woody species and reduced the vegetative cover that can protect lands from the impact of rainfall and encouraged the infiltration of water. The end result is then accelerated soil erosion. The growth of livestock population has been partly due to population growth, but it is also the result of insecurity, livestock seen as a source of security in times of drought and also an item to invest in, given the past and present uncertainty over land tenure (Wood, n.d.).

Population growth, among others, has also considerably contributed to environmental degradation through increased demand for an additional arable land and other basic necessities that come from our immediate needs. Expansion of arable land led to the clearance and cultivation of slopes and marginal lands, which are subject to severe erosion. Population growth has also reduced fallow period and led to more permanent cultivation, which, in turn, reduces the humus content and breaks down the structure of soil, making it less resistant to erosion. Hence, many authors attribute environmental degradation mainly to population growth (Hurni 1988; Shibru, 1996; Tewelde Berhan, 1996; TGE, 1993; Constable, 1984). Thereupon, they have reduced and attributed the complex problem of environmental degradation in the country mainly to demographic factors.

Population growth can partly and adversely influence environmental degradation. But in many situations, societies have adjusted to population growth through technological changes and developed a more intensive and conservation oriented farming and environmental recovery. The reason why such responses have not occurred in most parts of Ethiopia, other than the conditions noted earlier, is largely due to structural constraints and, unfavourable socio-economic and policy environments. Some of the problems that are faced may be institutional in nature. For instance, because of cultural orientation, in most cereal culture areas of highland Ethiopia peasants prefer to cultivate fine-seed crops such as teff and others, which as noted in one of the preceding paragraphs, make cultivated areas more vulnerable to erosion.

Adrian Wood (n.d.) reported that the feudal regimes in the past, the Haile Selassie Government in particular, neglected peasant agriculture (Dejene, 1990; Degefa 2002). There was little or no research and development of extension messages ear-marked to environmental protection until after the occurrence of wide spread drought and famine in 1973/74. It was only after 1968 that agricultural extension services started but it was restricted to a few highly productive areas. During the Derg period, the communist regime, due to budgetary constraints and ideological problems, agricultural extension remained short of fund and most of the resources were concentrated on increasing production in the `surplus producing` areas. Besides, land management was not well integrated with the farming system

and not given a due attention. These days too, there are a few selected peasant households that have access to the benefits from government extension package. Environmental management, however, still seems lacking a well-synchronized integration with the farming system.

Both under the Mengistu Regime and during Haile Selassie's Government, especially in the former, environmental conservation in the degraded parts of the country was primarily left to the NGOs, who had been initially involving themselves in relief work, and the government technocrats in the Ministry of Agriculture. Under the previous two regimes, and even now, I am afraid, environmental conservation and agricultural development have been seen as two separate activities, rather than as essentially related. They are still seen as two separate activities rather than essentially related ones. As a result, conservation oriented farming has not yet become a major part of government extension package, at least in application.

One of possible crucial factors that could have explained lack of wide spread use of environmental management practices in degraded parts of the country has been lack of land resource tenure security. Under the three successive regimes starting from Haile Selassie Government, and even before, many rural farm households have never been sure whether they would have the same plots of land to use in the coming years. As a result, many writers argue that farm households would not risk investing in soil conservation and aforestation measures whose returns are received in the long term (Dessalegn, 1996; Wood, n.d.). The problem of lack of land resources and tenure security has continued; it has been aggravated by the periodic reallocation of land among farm households despite population growth.

The accelerated forest degradation in Ethiopia, noted elsewhere, in the 1960s, 1970s, 1980s and early 1990s has been attributable not only to the demographic pressure but also to decades of misguided state policy, such as, for example, lack of land tenure security and giving little attention to peasant farming and environmental conservation practices, and lack of good governance. Massive destruction of forests and woodlands occurred on four significant occasions. The occasions that increased forest and woodland depletion include the time when the imperial regime proclaimed that all large scale forests in the country belonged to the state in the mid-1960s; following the land reform and expropriation of all forests in 1975; the massive villagization process, which was undertaken by the Derg regime in the 1980s, and the chaos at the time of the fall of the Derg regime (Desalegn, 1996).

Wars, particularly civil wars, have had also adverse effects on forest vegetation and woodlands. The history of Ethiopia is full of war, at least, since its emergence

as a 'modern state'. The civil wars we had at the time of the Derg regime, though not documented, could have possibly consumed large forests and woodlands for military operation purposes in the northern part of Ethiopia, especially in Tigray, Wello and Gondar regions. More recently, during the Ethio-Eritrean border war of 1998-2000, the Ethiopian government reported that the Eritrian troops cleared some of the woodlands that were found in the annexed highland territories of Tegray so as to clear the area for military operation and to build up trenches. Although not recorded, similar forest destruction, for the same reason and to minimize the risk of armed ambush by bandits, could have taken place elsewhere in many parts of Ethiopia including southern part.

An additional structural constraint has been rural poverty, caused partly by the poor returns from farming, with low yields and low market prices, both before and after 1974. Lack of access to road, markets and many other social and physical infrastructure, other than what is noted earlier, have led to little or no innovation, the relative stagnation of land use technology. But Crummey and Winter-Nelson (2003) argue 'despite deep continuity in farming practices, Ethiopian peasants have innovated and responded to changes in the physical and social environment'. Poverty has also been deepened by the extraction of the feudal authorities and the state. As a result, households could not afford to spend time and effort in unpaid environmental rehabilitation measures, which would have required them to forego other income earning opportunities that were necessary to supplement their household income and ensuring survival. Hence, seasonal labour migration during labour-slack seasons and rural non-farm activities were undertaken and environmental rehabilitation was neglected.

In most circumstances, the governments of Ethiopia, in the last three to four decades, have been practising environmental management measures that have been imposed from above. Peasant participatory method was not practised sufficiently. Rural communities could not participate in decision-making processes. They have been neglected all along. As a result, they remained indifferent and could not take active part in environmental conservation activities, or, if at all they participate, it could be by compulsion or in terms of Food for Work (FFW) scheme. Consequently, in many places the people so as to get additional payment for the same work that will be done again destroyed environmental conservation structures, which were constructed by FFW. These days many of the conservation structures are either destroyed or left with no maintenance. The other weakness of the 'top-down' approach pursued by the governments, Haile Selassie's and Derg Regimes in particular, in environmental conservation efforts has been the neglect of indigenous environmental conservation technology. The new technologies, like *fanya juu* bunds, imposed from outside could not be compatible to local ecological

conditions and became less effective to stop land degradation, rather in some instances, for example in East Gojam area, *fanya juu* caused more erosion damage in the fields (Woldeamlak Bewket, 2000).

Before the 1974 revolution, there was no effective village level structure for organizing the community in activities such as environmental rehabilitation. As a result, there was no body, at community level that could be responsible to co-ordinate land use activities toward environmental protection within villages. Therefore, communal grazing land resources and community forests were exploited in a competitive manner, and up slope activities, which have had serious impacts, could not be controlled. After the formation of the Kebele Peasant Associations (now renamed as 'Kebele Peasant Administrations' - KPA) in the rural communities in 1975, they filled the gap but with no much success, hence the problem was somehow perpetuated. The problem with the KPAs is that they lack democratic nature and they are there as *simple administrative tools* of the government, meant to politically control rural communities. As long as these organizations lack democratic nature and not duly empowered, they would not be of much help in organizing voluntary action groups among the rural communities and initiate active participation in environmental conservation decision making and other community development works.

7. Land use/land cover changes

Land is the principal resource of human beings in general and the agrarian society in particular. Its utilization reflects the reciprocal relationship between the prevailing ecological conditions of a particular region and a kind of permanent and cyclic intervention of man in his environment. Therefore, land use/land cover is thought as an important indicator of the state of natural capital resource base, consequently of the problems and/ or possibilities of sustainable development. The fact that the need of man increases and changes over time, the nature and degree of interaction between man and his environment changes. As a result, existing methods of exploitation and hence the land use/land cover patterns change. Accordingly, due to interacting human and natural factors, considerable changes have been observed in the land-use/land-cover of Ethiopia, at large, and the six KPAs of West Gurageland in the last four to five decades.

The available data, in spite of inconsistency and paucity, shows that there were considerable changes in the land use patterns of Ethiopia. Croplands increased from about 9.4 million hectares (7.7% of the total land area) in 1961 (CSO 1964) to about 18.2 million hectares (14.9%) in 1984/86 (FAO/UNDP 1984/86). Pasture lands decreased from about 66.24 million hectares (54.2%) in 1963/64 (CSO

1967/68) to 63.8 million hectares (52.2%) in 1984/86 (FAO/UNDP, 1984/86) and to about 48% more recently. Although land under perennial woody vegetation is expected to considerably decrease, it accounts for nearly 12% of the total land and only a quarter of it (3.5%) is under natural and man-made forests. Nearly one fifth of the total land (19%) is unutilizable for agricultural purposes (FAO/UNDP, 1984/86).

Furthermore, the 1998 land-use/land-cover surveys made in the six KPAs of West Gurageland showed significant changes in the land use/land cover patterns between 1957/67/71[1] and 1998. Most land use types of the six KPAs, with the exception of pasturelands and natural forest area, showed a considerable increase ranging from 25% for all cropped area to 170 % for eucalyptus wood lots (Table 1). The survey also disclosed that the area under perennial crops (largely ensete), which contributes to environmental enhancement, showed expansion by about 44%. The coverage by annual crops, which was more important in *dega* and portions of *kolla* zone, increased by about 17%. Land under all crops increased by about 25% in the last 30 to 43 years. Pastureland and shrub land coverage decreased by about 34 and 15%, respectively, in the above noted period. The rate of drop of pastureland coverage and shrub land has been much more important and it was as much as 74 and 50%, respectively, in *dega* zone, where land is more scarce.

[1] This refers to aerial photographs of 1957, 1967 and 1971, respectively, for Sheberaden, Kochira, Jatuna Aradashe and Tawulana Seyoma, Buredenana Denber and Koter Gedera KPAs.

TABLE 1. Land Use/Land Cover Changes of the Sir [illegible] and 1998

Land Use Unit		Coverage (%)		Change (%) [2]
		1957/67/71	1998	1957/67/71 – 1998
Cropland	Perennial cropland	9.9	14.1	43.7
	Annual cropland	21.3	24.8	16.4
	Total cropland	31.2	38.9	25.0
Pastureland (PL)		45.9	30.4	-33.7
Eucalyptuswoodland (EWL)		4.2	11.2	169.4
Forest (F)		2.4	2.4	0.0
Shrubland (SHL)		10.3	8.7	-15.3
Wasteland (WL)		1.5	2.2	53.2
Settlement and avenue (SA)		4.6	6.2	34.9
Total area (hectares)		7285.1	7300.6	

Source: Field Survey

[2] The changes during the specified periods were established by subtracting the coverage (%) of each land use/land cover unit of 1998 from the 1957/67/71 coverage (%) divided by the coverage of 1957/67/71 and multiplied by a hundred.

Table 2 gives the regional (zonal) point of view of rate of changes in the pattern. The rate of expansion of eucalyptus plantations has been the highest as much as 4% per annum, on the average, but it varied from 0.01% in Tawulana Seyoma (TS) to 7.3% in Burdenana Denber (BD). At agroclimatic zone level, the rate of expansion varied from 0.12% in *kolla* to 2.4% in *woina dega* and 7.3% per annum *dega*. Croplands increased in all regions at a rate of about 0.6% per annum on average. However, perennial crops expanded more widely, at a rate of about 1.1% per annum than annual crops (0.4%). The rate was higher, as much as 1.7% in the *dega* KPAs, 1.3% in the *woina dega* KPAs and only 0.6% per annum in the *kolla* KPAs. Hence, ensete has become more important than annual crops in the *dega* KPAs. Pasturelands and shrub lands, on the average, decreased by about 0.8% and 0.4% per annum, respectively, while wastelands and settlement and avenues increased at a rate of 1.3 and 0.9% per annum respectively. Thus, some of the land use/land cover units expanded at the expense of others by way of transformation from one type of land use unit to another or through modification.

TABLE 2 Annual Rate of Change of Land Use/Land Cover Units 1957/67/71–1998 at Agro-climatic Zone Level (% per annum)

Land Use Unit	*Dega* KPAs			*Woina Dega* KPAs			*Kolla* KPAs			All KPAs
	BD	KG	*Dega*	SHD	KCH	*Woina Dega*	JA	TS	*Kolla*	
PCL	1.7	1.3	1.7	0.64	1.7	1.3	1.5	-1.5	0.6	1.07
ACL	0.03	3.3	0.6	0.0	-	-	-1.07	0.26	0.2	0.4
CL	0.32	2.6	0.8	0.6	2.09	1.5	1.4	0.09	0.31	0.61
PL	-2.8	-2.4	-2.6	-032	-0.81	-0.6	-0.6	-0.13	-0.5	-0.82
EWL	7.3	3.9	5.8	0.52	3.7	2.4	0.27	0.01	0.12	4.13
F	-	-	-	-	-	-	-	-	-	-
SHL	-	-1.9	-1.7	-0.15	-2.4	-0.54	-1.1	-0.02	-0.16	-0.37
WL	-	3.0	3.2	0.38	-	0.45	0.03	-	0.015	1.30
SA	1.8	1.6	1.9	1.0	1.6	1.3	0.35	-0.5	-0.12	0.85

Source: Field Survey. BD = Burdenana Denber; KG = Koter Gedera; SHD = Shebraden; KCH = Kochira; JA = Jatuna Aradashe; TS = Tawulana Seyoma.

What may be more environmentally important is the change observed in the wasteland, shrub land, forest coverage and expansion of eucalyptus tree plantations. Because of the depletion of natural forests and clearing of shrub land for cultivation, and cutting trees for various purposes including charcoal making, construction and firewood, the environment appeared more degraded. Severely degraded areas (badlands) were expanded by about 53% (Table 1), which was as much as 1.3% per annum (Table 2), particularly in the transitional slope zones, in the last 30 to 43 years. This has been environmentally serious case. Human trampling along footpaths, deforestation, and overgrazing and inter-tribal conflicts in the past contributed to expansion of badlands and deepening of gullies in the

region. Before the region was integrated to the bigger political entity, Ethiopia, in the 1880s, there were inter-tribal conflicts and wars fought between inhabitants of Cheha and Eza. By way of defending ones territory in the fighting, trenches were dug so as to halt the enemy horsemen from penetrating and advancing into ones territory. The trenches, in time, developed into gullies and became instrumental for wide spread degradation in portions of the region. The survey results showed both expansion of wastelands and increased tree density in the region.

8. Towards Environmental Recovery

Contrary to the above noted degradation problems, and in spite of growing population pressure, widespread eucalyptus tree planting has been undertaken since the time of the integration of the region to the bigger political entity, Ethiopia. Hence, it is argued that an increase in planted-tree density in the region, particularly on degraded areas, may be considered marking the start of environmental recovery process. The result of household survey made in the six KPAs of the region (Table 3) indicated that 99% of the respondents took part in planting trees either on communal lands or private holdings or on both. On individual basis, one peasant planted, on the average, about 61 trees. Thereupon eucalyptus plantation density, as noted in Table1, increased by about 170% in the last four decades in the region (see Figure 1). This could have partly contributed to environmental recovery particularly in the degraded areas and justify the *more people more trees* situation, although it may be partly attributable to some other factors.

TABLE 3.Participation in Environmental Conservation Activities (%)

Conservation Measure	I took part		I did not participate	
	'99	Before '85	'99	Before 1985
Tree planting	98.7	60.0	1.3	40.0
Making terraces	50.6	38.5	28.7	37.0
Building check Dams	46.2	26.1	33.1	44.3
Damming streams	20.7	14.6	46.3	44.3

Source: Field Survey

Likewise, many empirical researches in other parts of Ethiopia and the world indicate that increase in population density may be associated with increases in planted-tree density. For example, Wood (1990) in the Northern Highlands of

Ethiopia, Hoben (1995) in Damot area, West Gojam, Wøien (1995) in Central and Northeastern Highlands of Ethiopia (North Shewa) and Muluneh (1994, 2003) in Sabat Bet Gurageland observed an increase in tree density, and hence, the *more people more tree* condition. Crummely and Winter-Nelson (2003) also reported that 26-73% of 202 sample households in three KPAs in South Wollo Zone reported with tree lots. Moreover, 83-97% of the household heads, which were interviewed, reported they have planted trees in the last 60 years. In other part of Africa, for example, such as in the two districts near Lake Victoria, Kenya, managed tree cover in agricultural areas was significantly greater in the late 1980s than earlier when population densities were lower (Templeton and Scherr 1993). Machakos district in eastern Kenya became more densely covered by large trees as the number of people increased five-fold between 1930 and 1990 (Tiffen et al, 1994). In Ruhengeri, Rwanda, although population was growing at 2.9% rate between 1978 and mid-1980s, reforested area nearly doubled (Ford 1993). In Algeria where most people live in or near the Atlas mountains, population growth was very high and the percentage increase in forest and woodland area was one of the largest of 127 countries in the 1970s (Heilig 1994).

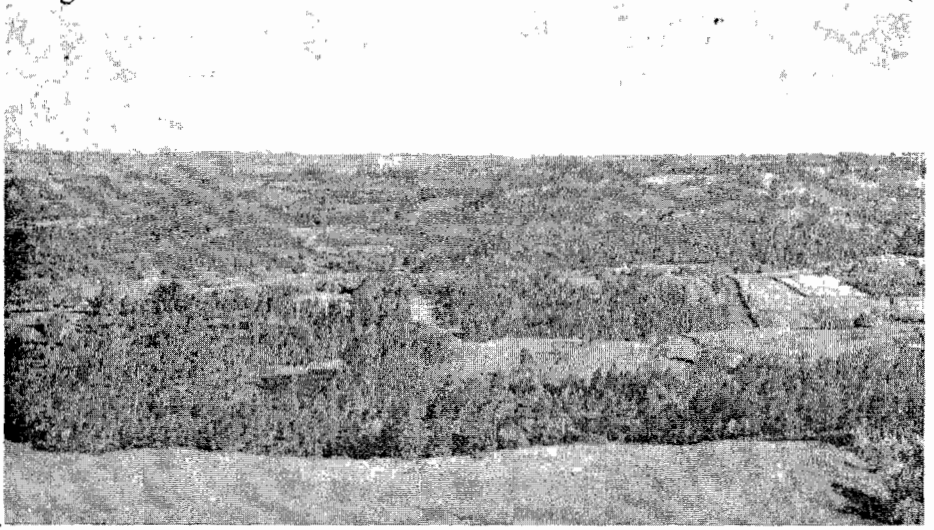


FIGURE 1 Wide Spread Tree Planting and Environmental Recovery, Kecher, Eza, Gurage Zone.

Similarly, other case studies indicate that when population density increased, people in some instances transformed naive forests, recently logged areas, into agroforests that are more economically beneficial and ecologically viable. For example, on the southern and eastern slopes of Mt. Kilimanjaro, one of the most

densely populated areas in Tanzania, the Chagga people replaced natural forests with home gardens, multi-storied agroforestery system (Fernadoes, et al 1984).

The household survey result also shows that the people in the six KPAs have developed a better conservation-oriented perception about their environment. About 70% of them started taking part in various conservation activities, such as planting trees, rehabilitating

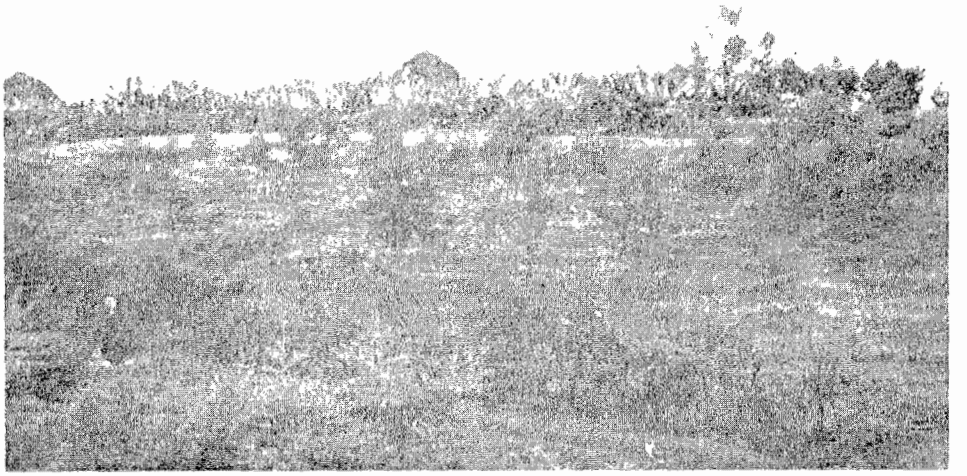


FIGURE 2 Bad Land in the Process of Rehabilitation by Terracing and Planting Trees & Grass, Dakune, Cheha, Gurage Zone.

badlands by making terraces along hillsides (51%) (See Figure 2), building check dams along gullies (46%) including vegetating gullies and badlands (Figure 2&3) and small streams (23%). Therefore, as noted in the preceding paragraphs, both degradation and various environmental conservation activities have been taking place in the same area (the six KPAs) and the region at large. This may be the case in many parts of Ethiopia. Therefore, it appears that population growth, together with socio-economic and institutional factors, on the one hand, accentuated the problem of environmental degradation. On the other hand, population growth, of course together with other factors such as improved access to road, town, market and information, has induced people to plant trees in degraded areas and outside.

This, therefore, serves the purpose of environmental conservation and recovery. The growing need of wood for construction and firewood partly due to population growth has been one of the major drives to planted-eucalyptus tree density increase. But the development of all season motorable road networks in the region since about the 1960s reported as one main factor in the expansion of eucalyptus tree plantation, chat and other cash tree crops (Muluneh, 1994).

FIGURE 3 Efforts to Minimize Soil Erosion and Rehabilitate Badlands by Planting Grass and Trees,
Sham, Eza, Gurage Zone.

9. Conclusion

Ethiopia, at least before the 1970s, in relative terms, was self-sufficient in food production. Its natural environment, for example, forest, soil and water resources, were in a better stable condition than thereafter. But since about the 1960s population growth rate started taking off, increased about triple fold, and was followed by excessive consumption and mining of forest and soil resources. It was starting from the imperial period, in the mid-1960s, that forest degradation accelerated and continued until this time, due to unfavourable government policies including lack of land tenure security exacerbated by growing population pressure. For similar reasons and lack of access to social and physical infrastructures, markets and extension services, stagnation of land use technology, limited or no farm input supply such as fertilizer, reduction of fallow period and continuous mining of the soil resulted in poor agricultural performance. Thus, food insecurity and the challenge of environmental problem increased in many parts of the country.

Much of the current discourse connected to population, environment and economy nexus reflects a strong neo-Malthusian bias. Many Ethiopian academics, government authorities and NGOs seem indoctrinated by and have a neo-Malthusian mindset. Many of them tell that population growth inevitably leads to greater demands for food, greater pressure on land leading to environmental degradation and then to poverty. They take a simplistic view that environmental

degradation is caused mainly by population growth and expansion of cultivation. They place much emphasis on the deleterious effects of population growth and link underdevelopment and environmental degradation of the country directly with demographic factors. For example, the 1994 Population Policy of Ethiopia and many of the environmental conservation and rehabilitation works done in the country by various governmental and non-governmental organizations since the second half of the 1970s were based on the misguiding orthodox neo-Malthusian assumptions. Such observers arrive at unrealistic conclusions that population must be reduced in order to address the problem and they disregard or give little attention to other main causes of the problem.

Based on the findings of this study and the opponents of neo-Malthusian position, as noted elsewhere, it is possible to argue that demographic factors have alone not been responsible for environmental degradation, at least, in West Gurageland, if not in Ethiopia at large. Non-demographic forces have also strongly influenced the dynamics observed in connection with the physical setting of the environment. In certain instances demographic pressure may not be critical to resource depletion, rather it may be compatible with environmental recovery and growth in agricultural production and living standards (Boserup, 1965, 1981; English, 1993; Tiffen, et al 1994; Dessalegn, 1996). Therefore, population may be regarded as an opportunity rather than a threat. Moreover, Blaike and Brookfield (1987), in one of their works, as noted by Desalegn (1996), argue that the common hypothesis, which attributes land degradation to population pressure alone is unconvincing; degradation is at the bottom of social and political problems. They make further remark that environmental degradation can occur not only under rising population pressure on resources but also under declining population pressure on resources, and even without population pressure on resources. Population pressure on resources can operate on both sides, contributing to degradation, and to aiding sustainable environmental management and repair (Blaike 1987).

Thus, in the light of the above ideas of the opponents of neo-Malthusians, my answer to the question John English (1993) asked, 'Does population growth inevitably lead to land degradation' in West Gurageland, depending upon the microeconomic environment and ecological setting, will be 'yes' and 'no'. Population growth in many developing countries can lead, depending upon the micro economic situation- market condition, institutional and organizational factors, access to information and land use innovation, local labor supply, intrinsic ecological condition etc.- either to land degradation or environmental enhancement or both (Templeton and Scherr 1997). Therefore, population growth, in the absence of favourable microeconomic environment, can be a threat if it is allowed to

aggravate degradation, or else becomes an opportunity for environmental enhancement and then development. Population growth alone does not necessarily lead to environmental degradation. The Ethiopian experience, in the last four to five decades, strongly suggests that 'insecurity in land resource property regime, neglect of peasant agriculture in terms of long term investments, disregard of peasants' indigenous knowledge in farm and environmental management, civil wars, social and political instability, misguided and often damaging resource management,' (Desalegn, 1996), lack of opportunities for non-farm income sources and markets, poor access to social and physical infrastructures and lack of good governance, policy environment and political stability have had greater impact on food production, environmental degradation and underdevelopment than demographic pressure. Hence, it is wise to adopt, on the part of the government and other practitioners, a more flexible approaches and policies in connection to the role of population in rural development and natural resource management.

In the last half-century, population increased more than three fold followed by depletion of natural forests, while eucalyptus wood lot, in spite of increasing land scarcity, and its incompatibility with the natural ecosystem, eucalyptus tree density increased by about two folds. Therefore, the *more people more trees* state of affair is once again established in the area. The *more tree* condition may be considered as environmental recovery if the cropped trees manage to harness land degradation, which is caused by soil erosion, and improve the hydrological regimes. However, as there is variation among farm households, environmental recovery due to increased planted-tree density may not necessarily be associated with growth in the economy. This, thus, requires a closer look and further studies.

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